

Speed of Sound, Ideal-Gas Heat Capacity at Constant Pressure, and Virial Coefficients of HFC-227ea

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1,1,1,2,3,3,3-heptafluoropropane (HFC-227ea) has zero ODP. It is a recently introduced, commercially available hydrofluorocarbon (HFC) useful in fire suppression, refrigeration, sterilization and propellant applications. It can be used as an alternative to halon, and blends containing HFC-227ea are potential alternatives to HCFC-22 and R502. Effective use of HFC-227ea requires that the thermodynamic and transport properties be accurately measured, but there are very little data available, and there are no available speed-of-sound data. This paper reports the experimental results of the speed of sound of the gaseous HFC-227ea measured for temperatures from 273 to 333 K and pressures from 60 to 400 kPa, with a cylindrical, variable-path acoustic interferometer operating at 156.252 kHz. The ideal-gas heat capacity at constant pressure and the second acoustic virial coefficients were determined over the temperature range from the speed-of-sound measurements. A correlation of the second virial coefficients for HFC-227ea was obtained by a semi-empirical method using the square-well potential for the intermolecular force and were compared with literature results.